TABLE 4.—*Number of occurrences of rainfall of 1.00 inch in 1 hour or more*—Continued

Station	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Columbia, Mo.			2	2	5	16	9	19	19	2	1		75
Columbia, S. C.		2	1		5	15	27	22	7	1			80
Columbus					1	4	6	10	3				24
Concordia				3	7	17	11	11	8	2			59
Corpus Christi	1		1	7	25	12	6	4	19	11	6	4	96
Davenport				3	1	11	13	11	10	3			52
Del Rio		1	3	4	12	11	8	4	6	7	4		60
Denver					1	1	6	3					11
Des Moines					10	11	7	8	9	2	1		48
Detroit						6	8	5	4	2			25
Devils Lake						3	5	5	4				17
Dodge City				2	4	9	9	8	3				35
Dubuque			1		4	9	9	13	8	2			46
Duluth					1	4	10	2	3				20
Eastport							3	1	3	3			10
Elkins					1	8	14	7	4				34
El Paso							4	1					5
Erie						6	8	8	3				25
Escanaba						1	4	3	7				15
Eureka [1]													
Evansville			1	3	6	11	9	14	8	2	2		56
Fort Smith			1	4	6	10	6	10	13	5	4		59
Fort Worth		1	3	8	16	22	7	13	13	5	5	1	94
Fresno				1						1			2
Galveston	8	3	11	17	21	16	16	13	25	21	6	10	167
Grand Junction [1]													
Grand Rapids				2	3	6	6	6	3		1		27
Green Bay					2	8	8	8	3				29
Harrisburg					2	5	8	11	6	5		1	38
Hartford						5	8	9	4	1			27
Hatteras	4	1	2	3	8	16	22	24	15	8	6	10	119
Havre							1	1					2
Helena									1				1
Honolulu	4	5	7	2	4	1		1	4	9	3	10	50
Huron					3	10	9	3		1			26
Indianapolis				2	1	6	17	10	6				42
Jacksonville	1	2	3	5	15	31	39	26	20	8	2	2	154
Kalispell								1					1
Kansas City			1	1	10	17	9	12	13	4	1		68
Keokuk					4	17	11	12	10	1	1		56
Key West	5	3	3	6	19	27	8	17	23	26	3	4	144
Knoxville				1		9	16	13	6				45
La Crosse				1	3	10	12	15	5	1			47
Lander						1	1						2
Lincoln				1	4	9	11	13	11	1			50
Little Rock		1	4	12	11	11	12	18	9	5	3	2	88
Los Angeles	1	1		1									3
Louisville		1	2	2	2	7	13	9	6		1		43
Lynchburg*				1	3	7	15	5	1	2			34
Macon	2	3	8	5	5	16	23	20	8	5	2	1	98
Madison					4	5	11	10	10	1			41
Marquette					1	5	2	2	3				13
Memphis		2	4	6	6	7	8	7	9	4	5	3	61
Meridian	4	7	12	12	16	25	28	22	11	6	5	9	157
Milwaukee				1	4	6	6	7	4	2			30
Minneapolis						13	12	10	4	1	1		41
Mobile	8	8	21	27	22	25	47	34	13	18	16	12	251
Modena							4	1					5
Montgomery	7	9	16	17	13	16	20	17	16	3	8	5	147
Moorhead					1	8	10	8	1				28
Nantucket						2	3	6	3	4	1		19
Nashville	4	3	3	5	6	13	12	13	4	2		4	69
New Haven						6	10	10	4		1		31
New Orleans	9	8	19	29	29	29	45	36	26	22	9	5	266

[1] None

*Broken record.

TABLE 4.—*Number of occurrences of rainfall of 1.00 inch in 1 hour or more*—Continued

Station	January	February	March	April	May	June	July	August	September	October	November	December	Annual
New York			1			6	17	9	4	3			40
Norfolk				1	3	12	23	13	10	1	1	3	67
Northfield*							2	5					7
North Head													
North Platte				2	3	6	7	6	1	1			26
Oklahoma City			1	5	16	13	11	9	7	5	4		71
Omaha				2	4	14	11	7	5				43
Oswego					1	4	2		3				10
Palestine	2		6	13	16	15	9	9	11	6	7	7	101
Parkersburg				1	1	7	11	12	6				38
Pensacola	6	6	12	27	15	12	38	38	20	19	12	11	216
Peoria			1	2	9	12	13	12	13	1	1		64
Philadelphia		1	2	5	6	13	11	8					46
Phoenix							3	1	2				6
Pittsburg						6	15	6	5				32
Pocatello							1	2					3
Portland, Maine						1	2	4	3		1		11
Portland, Oreg.						1							1
Providence					1	3	8	3	6	1			22
Pueblo					2	4	7	2	1				16
Raleigh			2	5	5	17	27	30	13	4	1		104
Rapid City					3	1	4	5	2				15
Reno [1]													
Richmond				2	4	13	19	17	7	2			64
Rochester						2	3	4	2				11
Roseburg					1								1
Roswell				4	3	4	2	4	2	1			20
Sacramento				1									1
St. Louis			1	5	3	6	13	14	12	1			55
Salt Lake City								1					1
San Antonio	1		4	14	19	14	6	7	8	8	1	1	83
San Diego				1									1
Sandusky				1	2	6	5	7	6	1			28
San Francisco			1										1
San Jose [1]													
San Juan	7	4	4	12	18	18	11	6	20	15	22	8	145
Santa Fe						1		1	2				4
Sault Ste. Marie							3	3	2				8
Savannah	1	1	1	3	11	16	33	36	30	6	2		140
Scranton		1				11	13	9	3				37
Seattle [1]													
Sheridan					1	2	1	1					5
Shreveport	2	1	8	11	16	9	18	8	12	11	7	5	108
Sioux City					3	13	11	7	10				44
Spokane [1]													
Springfield, Ill.				2	1	4	15	10	8	9	1	1	51
Springfield, Mo.				2	2	2	16	9	14	5	2		52
Syracuse						1	7	10	6	1			25
Tampa	6	5	7	9	20	39	30	49	25	8	2	1	201
Tatoosh Island										1	1		2
Toledo					1	1	5	4	9	7	1		28
Topeka				3	5	11	13	16	13	14	4	1	80
Valentine*					3	1	7	6	1				18
Vicksburg	5	6	14	18	18	14	17	13	9	6	3	11	138
Walla Walla [1]													
Washington, D. C.						3	11	18	17	14	3		66
Wichita				4	7	20	11	9	5	4	2		62
Williston						12	4	4					20
Wilmington	3	1	1	2	5	14	33	30	19	4	2	1	115
Winnemucca [1]													
Wytheville						2	8	9	10	4		1	34
Yellowstone Park [1]													
Yuma							2	2		1			5

[1] None.

*Broken record.

COMPARISON OF EXTREME GUST VELOCITIES AS RECORDED BY THE DINES ANEMOMETER AND 5-MINUTE VELOCITIES AS RECORDED BY THE ROBINSON ANEMOMETER

By H. D. DYCK

[Weather Bureau, Washington, D. C., May 1941]

The Weather Bureau records the highest wind velocities for each day in two ways: (1) by the greatest number of miles recorded in a fixed period of time, 5 minutes, called the *maximum velocity;* (2) by the mile recorded in the shortest period of time, called the *extreme velocity.* In a previous study of wind velocities as recorded by the Dines and the Robinson anemometers,[1] extreme gusts and average velocities by the Dines anemometer were compared with the extreme velocity or fastest mile recorded by the Robinson anemometer. The present study, intended as a supplement to the former, compares 5-minute velocities recorded by the Robinson anemometer with extreme gust velocities recorded by the Dines.

The wind records for 1939 at Washington, D. C., with the exception of a few of the higher velocities used in extending the graph, were used in this comparison. Data were used only when the wind was of fairly constant structure. Due to the proximity of an effective barrier about 200 feet south of the exposed instruments, the data used here are taken almost exclusively from periods when the wind was northwest. Also, practically no records were used for the months May to October, since high velocities during these months usually occurred during thunderstorms when the wind rose to a high velocity

[1] Mattice, W. A. A comparison between wind velocities as recorded by the Dines and Robinson anemometers. MO. WEA. REV., August 1938, 66: 238-240

within a very few minutes and diminished again as rapidly. Comparisons of these instances showed a very erratic distribution, the position of the points varying with the length of time required for the wind to reach the extreme gust and decline again. Since the greatest interest is in higher gust velocities, few measurements were taken of velocities less than 25 miles per hour as

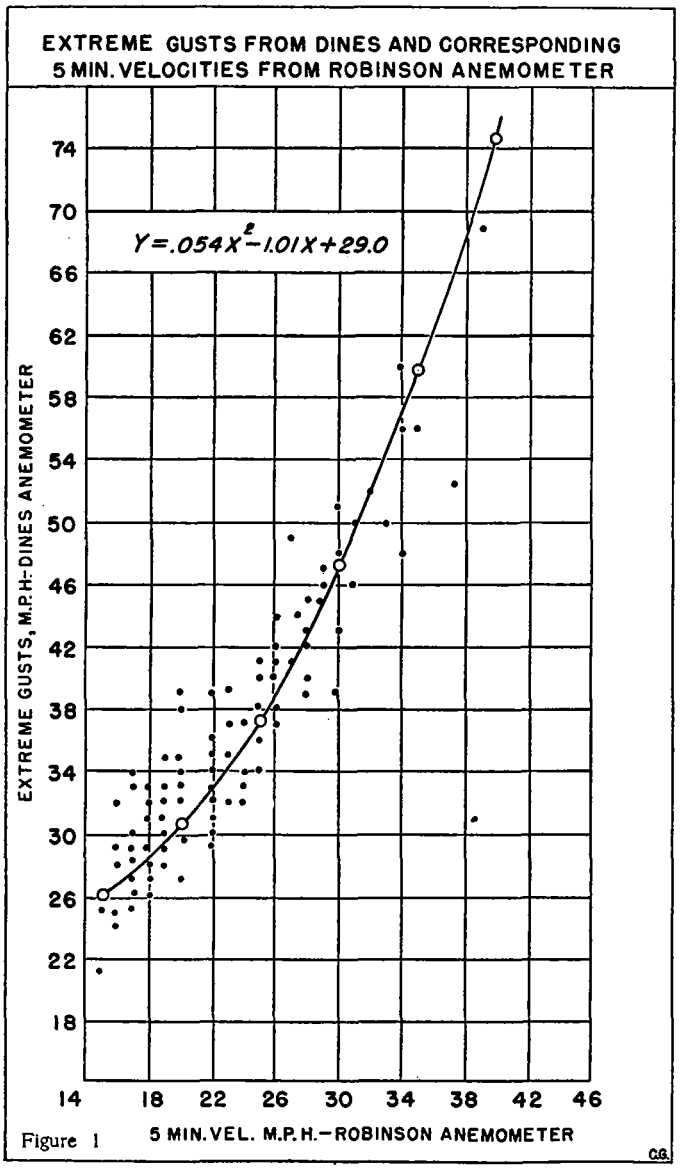

Figure 1

recorded by the Dines instrument. All velocities were corrected to true velocities.

Upon examination of the Dines anemometer record, it may be seen that variations of wave-like nature appear, even though the wind structure is fairly uniform. These fluctuations or waves are never of regular length and there are countless smaller fluctuations superposed on the larger ones. Usually, however, during a period of several hours, two or three pronounced points of maxima occur and at or near these points the "extreme gust" will be found. Such "extreme gusts" were chosen as the subjects for comparison in the first part of this study. Frequently several such gusts were taken from the same day's record; in only four instances, however, was more than one observation taken from an hour's record. For the corresponding 5-minute velocity from the Robinson record, that one was taken which included in it the time of occurrence of the "extreme gust" and at the same time gave the highest possible 5-minute velocity. Attention is drawn here to the fact that the 5-minute periods which included the time of the "extreme gusts" did not necessarily include the maximum or highest 5-minute velocity for the day. The corresponding velocities obtained as explained are shown in figure 1. The equation of the line which seemed to fit the greater part of the data is an approximation only, obtained by fitting a parabola to points taken on a curve which had been sketched. It is not applicable beyond the limits of the graph.

In about half of the days studied the maximum or highest 5-minute velocity for the day coincided with the extreme gust for the day, and in 85 percent of the days studied the maximum velocity occurred within an hour

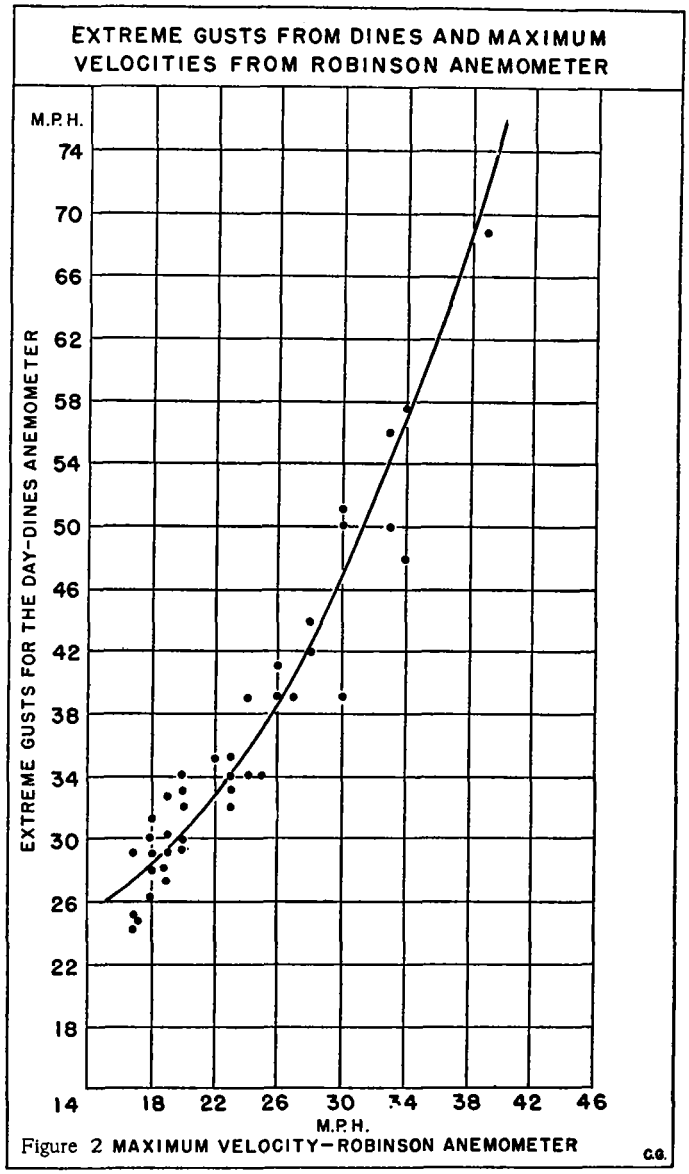

Figure 2 MAXIMUM VELOCITY-ROBINSON ANEMOMETER

of the extreme gust. It seemed likely, therefore that some relation existed between these two velocities. Accordingly, corresponding velocities were noted from this 85 percent and results plotted in figure 2. The curve from figure 1 was superimposed.

Since the results are approximations, no further analysis was attempted.